In this work Cadmium Telluride/Cadmium Sulfide (CdTe/CdS) quantum dots functionalized with mercaptosuccinic acid (MSA) was synthesized in aqueous medium and characterized by optical spectroscopy and X-Ray diffractometry. To increase cellular uptake and decrease nanoparticle toxicity, the QDs were then encapsulated into neutral and cationic liposomes (Lipo-QDs) and characterized by zeta potential (−20mV and +44 mV for neutral and cationic liposomes respectively),and transmission electron microscopy. The Lipo-QDs systems were incubated with MSCs and cellular uptake was measured by flow cytometry.
An increase in labeling efficiency with positively charged liposome was observed when compared with the QDs alone and neutral liposomes. Lipo-QDs toxicities are under investigation. These preliminary data indicate that Lipo-QDs might be suitable for real time tracking of stem cells after transplantation, and thus might be a promising tool for imaging stem cell therapy in vivo.

3134-Pos Board B826
Fluorescence Correlation Spectroscopy of Methane-Burn Carbon Nanodots
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Carbon nanodots, i.e. c-dots, have recently emerged as new class of fluorescent labels with tunable emission characteristics, high quantum yields and photostability, and with a low toxicity as compared to semiconductor quantum dots. In a previous report by Geddes and co-workers [1] it was demonstrated that the emission properties of c-dots can be further amplified by plasmon supporting materials, such as silver island films, however, it was reported that inhomogeneity due to the c-dot size distribution complicated the interpretation of the emission data. In the present report we apply the technique of fluorescence correlation spectroscopy, FCS, to characterize c-dots synthetically realized by the flame combustion of hydrocarbon/oxygen mixtures where particles are collected from the exhaust gases in liquid traps. We report a correlation between the c-dots particle size distribution with the stoichiometric composition of the flame and compare results with fluorescence anisotropy measurements.
[1] Yongxia Zhang, Helena Gonçalves, Joaquim C. G. Esteves da Silva and Chris D. Geddes, Metal-enhanced photoluminescence from carbon nanodots, Chem. Commun. , 2011, 47, 5313-5315.

3135-Pos Board B827
Quartz Nanopipettes for the Study of Protein-Protein Interaction
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The modified quartz nanopipettes are used to study the protein-protein interaction between human neuroglobin (hNgb) and cytochrome C (Cyt c). Upon modification of inner wall of the nanopipettes with charged molecules, the variation in surface charge near the pipette orifice induces the detectable ionic current. This mechanism is also explained by finite element based numerical simulations. While negatively charged hNgb modified pipette tip is exposed to positively charged Cyt c, kept in bath at different concentrations, we are able to derive the equilibrium dissociation constant (KD) of the interaction. The derived KD value matched well with the value from surface plasmon resonance (SPR) measurements. Our results demonstrate the potential application of quartz nanopipettes to study protein-protein interaction quantitatively.

3136-Pos Board B828
Structural and Dynamical Properties of Monoclonal Antibodies Immobilized on CNTs: A Computational Study
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Due to the widespread application of Carbon Nanotubes (CNT)-based materials in nanomedicine, it is nowadays of paramount importance to unravel at the atomistic level of detail the structural properties of such bioconjugates in order to rationalize and predict the effect exerted by the nanomaterial on the bioactive counterpart. Herein, we present all-atom explicit solvent Molecular Dynamics (MD) simulations investigating the spatial orientation, structural and dynamical properties of a non-covalent bioconjugate where the monoclonal Cetuximab antibody (Ctx) is adsorbed on a CNT surface. Exploring the CNT diameter-dependent behavior by docking studies the three most representative adsorption modes were selected, then force-field MD and DFT simulations unambiguously showed that hydrophobic interactions mainly govern the adsorption of the protein on the graphitic surface. In all the predicted poses, the secondary structure of Ctx is largely unaffected by the CNT and, consistently with previous literature studies, our simulations reveal that positively charged amino acidic residues, such as Lys and Arg, predominantly contribute to the stabilization of the CNT•Ctx complex acting like surfactants. The predicted structural models are validated and consistent with the experimental data, for which the immobilization of the antibody on CNTs does not disrupt the structural and recognition properties of the Ctx, consequently supporting the reliability of the used bioconjugation strategy for engineering stable and responsive hybrid nanomaterials for therapeutic applications. Moreover, a remarkable structural similarity of Ctx with antibodies of different isotypes suggests that in principle the CNT framework can interact in the same manner with all Abs currently used in clinical applications. This study represents the first step towards the understanding of the physic-chemical principles ruling the adsorption of Abs on CNTs, exploitable for the design of new carbon-based nanomaterials for biochemical applications.

3137-Pos Board B829
Reduced Concentration Limit of Nucleic Acid Biosensor by Utilizing Long DNA
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We previously described a simple, PCR-free, low cost device for sequence-specific nucleic acid detection which coupled target nucleic acids to a bead and measured the blockade of a large pore by the bead, achieving a 10 pM concentration detection limit of 20-mer DNA oligomers. Here, we describe function of our device for detection of longer DNA fragments. We prepared four different DNA fragments containing a specific target sequence 110, 235, 419, and 1613 nucleotides in length, and four different control fragments not containing the target sequence 125, 184, 309, and 1503 nucleotides in length. We examined detection of the target DNA oligomers at concentrations of 1pM - 1fM, finding that as target DNA length increased, lower concentrations were detectable, with a 10 fM detection limit for the 419 and 1613 nucleotide DNA oligomers.
L. Esfandiari et al., J. Am. Chem. Soc., vol. 134, no. 38, pp. 15880-15886, 2012.

3138-Pos Board B830
Quasy Autonomous Microrobots Driven by Light
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Self propelled robots are interesting both for technology (primarily biotechnology) and for basic science in the investigation of collective motion. Numerous experimental model systems have been developed and used for different applications. The solutions range from simple specially shaped particles [1] to complex robots [2].
Here we introduce moving microscopic swimmers where the objects move on a flat horizontal surface and the energy neeeded for the motion is provided by light. In contrast to the usual optical micromanipulation techniques, the direction of motion is not determined by the illuminating light. The whole area where the particles move is illuminated vertically from above and the objects move in an autonomous manner, in a direction determined by their position and orientation.
The specially shaped objects are built by two photon induced photopolymerization. Two types of swimmers are discussed: a simple vedge shape [3] and a roller. Both are reflective and they are driven by the momentum change of light reflected from their surface.
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3139-Pos Board B831
Modeling Evaporation in Aqueous Nanodroplets
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The processes of evaporation and condensation of water at small scales is not well understood. Understanding these processes and their contributions to